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Barberry Eradication in 1929



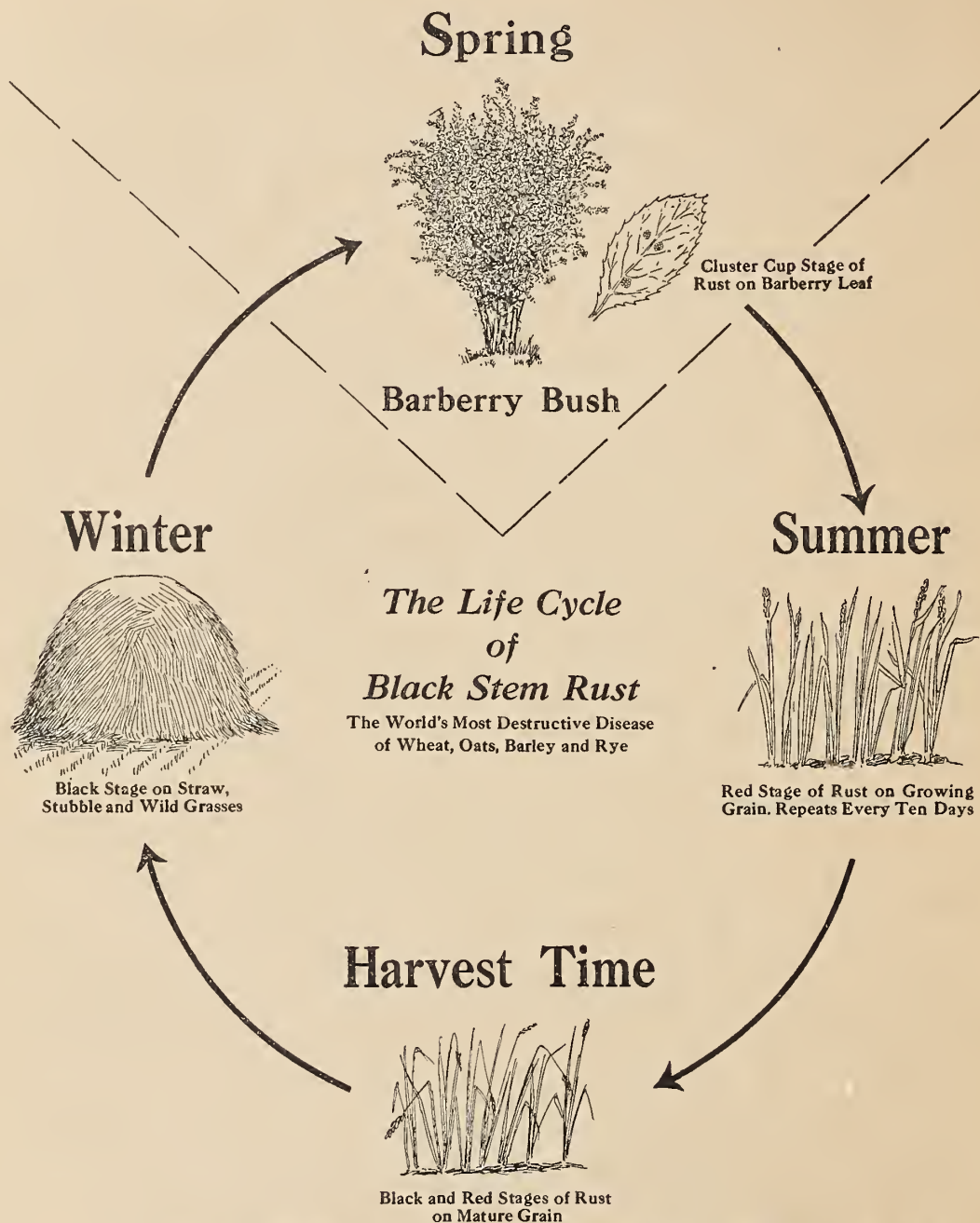
Summarized Results Covering
the Period 1918-1929



Office of Barberry Eradication
Bureau of Plant Industry
U. S. Department of Agriculture

March 1930

Remove the Barberry and Break the Rust Cycle



All Common Barberries act as starting points for Black Stem Rust early each spring. By destroying the barberry the early spring source of black stem rust is eliminated. The Common Barberry provides a means to bridge the gap between the black stage on grain in the fall and the red stage of the rust on grains and grasses the following spring.

**BOOST BARBERRY ERADICATION—A PRACTICAL RUST
CONTROL MEASURE**

BARBERRY ERADICATION

IN 1929

and

SUMMARIZED RESULTS COVERING THE PERIOD 1918 - 1929

by

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Office of Barberry Eradication

Bureau of Plant Industry

Credit and appreciation are hereby gladly given to Barberry Eradication Leaders, Agents, and Collaborators who have supplied data, and to Miss Burnis Benson and Miss Daphne Anderson and other who have aided in the preparation of this report.

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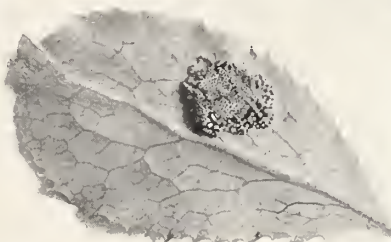
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BLACK STEM RUST SPREADS FROM COMMON BARBERRIES



to Wheat, Oats, Barley, Rye and other Grasses.

Black Stem Rust as it appears on the leaves of the Common Barberry



Enlarged single leaf



Plump healthy grain



Shriveled rusted grain

DANGEROUS NEIGHBORS



Common Barberry Bushes growing near grain fields

Report Common Barberry bushes you may find to your State Leader of Barberry Eradication.



Common Barberry is harmful, destroy



Japanese Barberry is harmless, do not destroy



INTRODUCTION

The campaign to control black stem rust of small grains through the eradication of the alternate host, the common barberry (Berberis vulgaris L.), has been in progress for 12 years. The project was initiated in 1913 after the nation had been startled by the stem-rust epidemic of 1916 which caused a loss of wheat estimated to have been worth \$283,600,000. The eradication campaign since that time has resulted in the destruction of more than 18,143,000 common barberry bushes and seedlings. Of this total, over 550,000 were destroyed during 1929.

The gradual removal of this enormous number of common barberry bushes in the eradication area during the 12-year period has been followed by definite reductions in stem-rust losses in the wheat-producing regions. In general this diminution in losses has been progressive from the beginning of barberry eradication to the present time.

Common barberry bushes were introduced into the eradication area as ornamental shrubs propagated and extensively distributed by the nursery trade. However, at the beginning of the eradication campaign the plant was found not only under cultivation but in enormous uncultivated areas into which it had escaped and where for many generations bushes had resulted from seed spread from original plantings. By a preliminary survey of all residences in cities and country most of the planted bushes were found and destroyed. At this time the widespread existence of the escaped bushes was discovered and many were destroyed. More intensive survey in later years has removed millions more of them, yet many are still growing in grain-producing regions at the present time and constitute the chief problem of the campaign. These escaped bushes must be found and destroyed if the encouraging results achieved thus far are to be made permanent.

Organization

Barberry eradication has been conducted by the Bureau of Plant Industry of the U. S. Department of Agriculture in cooperation with the 13 States of the north-central grain-growing region. These include Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming.

Barberry-eradication activities carried on in 1929 fall into three general categories, (1) survey and eradication, (2) education and publicity, and (3) investigation.

Cooperation

The barberry-eradication campaign is organized upon a cooperative basis between the U. S. Department of Agriculture and the States in the eradication area. Cooperative relations exist with the State agricultural colleges in all of the States and with most of the State departments of agriculture. Office space and equipment are provided by one or the other, of these institutions in most of the States.

The Conference for the Prevention of Grain Rust of Minneapolis, an organization of agricultural and business leaders in the eradication area, has taken the leadership in educational and publicity work. This organization also has provided both funds and materials for use in that phase of the campaign. In addition it has cooperated effectively in establishing cooperative relations between the barberry-eradication project and organizations within the States.

Commercial groups, local and State agricultural organizations, State, county and town weed-control officials, as well as thousands of property owners, have given very effective support to the campaign.

State and county educational institutions and departments have responded very enthusiastically in helping to teach the facts upon which rust control through barberry eradication is founded. These include State universities, colleges, normal schools, high schools and county school systems, as well as State departments of public instruction and agricultural extension services.

Finances

Financial support of barberry eradication is supplied very largely through Federal appropriation. For the fiscal year ending June 30, 1930, this appropriation is \$379,920. All Federal appropriations since the beginning of the campaign total \$3,692,715.

Many of the States have made direct cash appropriations and given indirect financial aid in services and equipment. The State appropriations and indirect aid furnished in 1929 totaled \$93,490. During the entire campaign the States have contributed \$917,457 for barberry eradication work in cash and indirect aid.

SURVEYS AND ERADICATION

Methods used in all orders of survey have tended to become increasingly intensive since the beginning of the campaign. Very careful and thorough search is necessary to insure the finding of all barberry bushes. Where they grow in areas covered with heavy timber and brush, field men must work in a line at very short intervals. Even bushes large enough to bear fruit and that are likely to distribute the plant still farther may easily escape notice under these conditions. The squad leaders work behind the men, checking the method being used as well as the thoroughness of inspection.

Eradication

Eradication this year was accomplished primarily by application of common salt. Kerosene also was used but only to a minor extent. These two chemicals have been found to be the most efficient, most easily available in all localities, and most economical of the many tested in this work. The use of chemical treatment rather than the practice of digging or grubbing has reduced the sprouting of bushes from a major problem of the work to one of minor importance.

More than 240 tons of salt and 890 gallons of kerosene were used in 1929 for eradication purposes. More than 539,750 bushes, sprouting bushes, and seedlings were killed by chemical treatment. Only 11,834 bushes, sprouting bushes, and seedlings were dug or pulled in 1929.

INVESTIGATIONS

Investigational activities in the barberry-eradication campaign have included (1) stem-rust epidemiology studies, (2) investigation of susceptibility and resistance of Berberis and related genera to stem rust, (3) classification of barberry species, varieties and hybrids, and (4) investigation of factors influencing seed germination and survival of barberry seedlings.

Stem-Rust Epidemiology Studies

Personnel

The following persons were engaged in the studies during all or part of the season: Stakman, Hamilton, Cotter, Hines, Butler, Ukkolberg, Melander, Person, Humphrey. In addition, other members of the Office of Cereal Crops and Diseases, including State Leaders of Barberry Eradication, cooperated closely and furnished valuable information.

Objects of Studies

The epidemiology studies made during 1929 were designed to ascertain the importance of the barberry in disseminating rust, the degree to which the uredinial stage overwintered in different sections of the country, the possible migration of rust from south to north, and the factors affecting the development of the rust in the spring wheat area. During the critical period for the development of rust, weekly reports were furnished, giving information regarding the stage of rust development and the probability of damage. Controlled experiments in greenhouse and laboratory also were made to obtain additional information regarding the effect of environmental factors on the development of rust. Some experiments were made on the possibility of controlling rust by means of sulphur dust. Inoculations to determine resistant and susceptible species of barberry were continued, and studies were made of hybridization between varieties and forms of stem rust on barberry.

Overwintering of the Uredinial Stage

The winter of 1928-29 apparently was favorable for overwintering of stem rust in the South. Observations indicate that stem rust of wheat overwintered fairly abundantly in central Texas. Sporadic overwintering also apparently occurred on wheat in northern Texas; evidence was obtained in two locations. Definite evidence was obtained that stem rust overwintered in five fields of oats near San Antonio. There is evidence that the uredinial stage persisted through the winter also in Louisiana, Alabama, Missouri, and Illinois.

Leaf rusts also overwintered rather commonly in the Mississippi Valley.

Migration of Rust from South to North

The possibility of migration from South to North was studied by three methods: direct observations on the extension of rust northward from Texas; a study of the spore content of the air; and physiologic-form surveys.

Direct Observations

Aside from fields in which rust overwintered, rust began to appear in southern Texas about April 20. Infection already was prevalent in centers in the central section, as a result of overwintering and probably also partly as a result of inoculum blown in from northern Mexico during late February. By late May there was fairly abundant rust in Texas for dissemination northward, and field observations indicate that spores were carried as far as Fremont, Nebraska, by the southerly winds of May 25-28. Subsequently, successive and overlapping waves extended the inoculated area into Canada. Infection appeared in Nebraska over a wide territory while grain was still in the joint stage. Infection also appeared early - about June 20 - in much of the spring wheat area. There undoubtedly was a general migration from south to north, as was perfectly evident from systematic observations made from Texas northward during May and June. In addition, slides were exposed at various places, particularly when there were south winds, to determine whether viable urediniospores were being blown northward.

Slide Exposures

Exposures were made in the Southern States early in the season, and in Indiana, Minnesota, and North Dakota. Results support the facts obtained by direct observations. For example, during a strong south wind on June 10, stem-rust spores were caught in the vicinity of St. Paul. During the next period of strong southerly winds at St. Paul, June 15-17, a larger number of spores were trapped, particularly on the 16th. Germination tests of some of the material were made, and the spores were found to be viable. There were rains on the 10th and the 19th, and the subsequent development of rust indicated that it was the result of inoculation by the spores which were blown from the South.

Physiologic-form Surveys

Puccinia graminis tritici. The results of the survey show that in general the same forms were present from Texas northward through the spring wheat area. A special effort was made this year to secure a general distribution of collections for identification. When available, two collections from every county were used for inoculations. Seven hundred fifty-five identifications of wheat rust were made, comprising 25 different forms, of which 4 were hitherto unknown. There was a widespread

distribution of forms 49, 38, 36, 21, and 11 from south to north and east to west. Form 49 was more prevalent than the other forms isolated from collections made in northern Mexico, where rust was heavy. It also was the most prevalent form in Texas. Form 38, while widespread in Mexico and from Texas northward, was particularly prevalent in Ohio, and possibly in the rest of the soft red winter wheat area, although from the other States in that area insufficient collections were received on which to base conclusions. Form 38 also was collected from New York, Pennsylvania, Maryland, and Virginia. Of the widely prevalent forms, all but 38 attack common wheats of the spring wheat area.

P. graminis avenae. A physiologic-form survey also was made of oats stem rust. Three hundred forty-seven collections were used for inoculation, and 226 identifications were made. Form 2 or form 5 were found in all collections, although not always both of them. These two forms were distributed over a wide area, especially form 5, which apparently is increasing in prevalence year by year. Form 1 was identified only once, in a collection from New York.

Barberries. Of 68 collections of aecial material from barberries, infection was obtained with only 30. Of these, 18 were secalis, 5 were secalis and tritici, and 14 tritici alone. Eleven different physiologic forms of the tritici variety were identified from the 14 collections of the tritici variety, and although the data are too meager on which to base conclusions, they suggest that many forms are propagated on the barberry. Form 36 comprised 28 per cent of the aecial cultures identified.

Development of Rust near Barberries

In most places rust appeared earlier on barberries than in 1928. The aecial stage had developed in Kansas by April 23, Maryland April 24, in Missouri, Indiana, and Illinois May 3, and in Iowa and South Dakota by the middle of May. Rust had already spread from barberries in Ohio, Indiana, South Dakota, and Minnesota by June 10. In the States east of the Mississippi the earliest rust infection on grains and grasses was usually found near barberries although in some cases it appeared near the bushes at about the same time as infection became general. In Wisconsin general infection appeared several days later than rust near barberries, and it appeared a week or more later in the fields in general than it did near barberries in most of the neighboring States.

In some States there were numerous local epidemics near barberry bushes. This was very clearly true of Wisconsin, in which there were numerous local epidemics, and throughout the season the rust was heavier in these areas than it was in fields in general. There is a possibility that the destructive regional epidemic in Lamoure, Dickey, Logan, and McIntosh counties, North Dakota, and extending into South Dakota, may have been due to infected barberries. A similar epidemic extending about 25 miles northwestward from Bismarck, N. Dak.,

apparently was attributable to barberries.

There was no clear-cut evidence that rusted barberries in Kansas and Missouri furnished much inoculum for grain-growing areas farther north, although it seems entirely probable that in some years they do.

Some of the most striking examples of destructiveness of rust near barberries were observed in southwestern Virginia and in Pennsylvania. The conditions in those States furnished an object lesson on the destructiveness of rust near the bushes.

Development of Rust in Spring-Wheat Area

There was not a general epidemic of stem rust in the spring wheat area. It is evident from the preceding sections that there was abundant inoculum and that it came early. In general, however, there was insufficient rainfall to make possible the development of a general epidemic. In some localities and in some rather restricted areas there was heavy damage from rust because of the fact that local showers furnished abundant moisture. The aggregate losses, however, were relatively light. For the entire spring wheat area the loss was approximately 3 per cent of the total crop.

It was repeatedly observed, particularly in southern Minnesota, that the greatest rust damage occurred in fields that had been too heavily fertilized with barnyard manure. The delay in maturity resulting from this practice made it possible for the rust to become very destructive, whereas early maturing fields escaped damage entirely. This suggests the strong desirability of getting additional information on the effect of earliness of planting and different methods of fertilization on the development and destructiveness of rust.

Controlled Experiments on Factors Affecting the Development of Rust

In a study of the factors affecting the development of the aecial stage of stem rust, it was found that teliospores may remain viable for at least a year and a half. It was shown that they do not necessarily germinate during early spring rains before barberry leaves have unfolded, as spores kept wet continuously for 264 hours were still able to cause infection. The minimum time required for infection was 21 hours. Temperature ranging from 12 to 21°C. was most favorable for infection of barberries and production of aeciospores. The mycelium was not killed inside of barberries kept for three weeks at 0°C. Low temperatures killed barberries before it killed the rust mycelium. Aeciospores were still discharged from aecia 37 days after their formation, and still caused infection 46 days after the appearance of the aecia. Leaves of common barberry were still susceptible 12 days after they had unfolded, while those of Berberis aetnensis were still

susceptible 16 days after unfolding. These facts show that the aecial stage of the rust is well adapted to the variable weather conditions of the spring.

A study also was made of the factors affecting the development of the uredinial stage. It was found that temperature and light have a decided effect on the resistance of urediniospores to low temperatures. The weather conditions in the fall, therefore, probably determine to a considerable extent the ability of the urediniospores formed during that period to resist unfavorable conditions in the winter. It was shown that uredinial mycelium may remain dormant in infected plants as long as 60 days at low temperatures. The variety of rust on rye develops better at low temperatures than that on wheat, and the development of different physiologic forms of the oats and wheat varieties of rust are affected differently by temperature. Some develop relatively well at low temperatures, while others require higher temperatures. This may explain to a certain extent the geographic and seasonal distribution of physiologic forms. The type and degree of infection also are affected considerably by temperature. The degree of infection is profoundly affected by light, high light intensities being especially favorable for the development of rust.

Dusting as a Control Measure

Further experiments were made on the possibility of controlling rust by dusting growing plants with finely divided sulphur dusts. The results in general confirmed those obtained in previous years, although they were not very conclusive in many cases because of the relatively small amount of rust that developed, owing to dry weather.

Barberry Inoculations

During 1929 work was continued on the determination of susceptibility of species and varieties of Berberis to P. graminis. Plants of 59 species and varieties, comprising 77 series of 3 plants each and a check, were inoculated with one or more of four varieties of stem rust. Plants of 35 of the species tested became infected.

The following species did not become infected as a result of artificial inoculation: B. acuminata, B. concinna, B. dictyophylla var. albicaulis, B. edgeworthiana, B. insignis, B. sanguinea. Although plants of these species were inoculated repeatedly, none of them became infected, while the checks were moderately to heavily rusted in each case. Further trials will be made, however, before pronouncing these species definitely as immune.

No additions were made to the list of susceptible species.

Hybridization of Physiologic Forms on the Barberry

It has long been suspected that different varieties and physiologic forms of stem rust might hybridize on barberries, where the sexual stage of the rust develops. This supposition has been confirmed by experiments made during the past year. It has been shown conclusively that new physiologic forms or parasitic strains may originate in this way. This fact emphasizes the absolute necessity for pushing the barberry eradication campaign as rapidly as possible to a successful conclusion. It is perfectly evident not only that the barberries are important in giving the rust an early start in the spring, in the development of local and regional epidemics, but also in the production of new parasitic strains of rust. The barberry is the breeding ground for new parasitic strains of rust. The eradication of the bushes therefore will not only reduce the amount of rust but will also reduce the number of forms now in existence and prevent the origin of new forms by hybridization, thus making it possible to progress more rapidly in the work of developing rust-resistant varieties of small grains.

Classification of Barberry Species, Varieties, and Hybrids

The collection of Berberis at the U. S. Plant Field Station at Bell, Maryland, which includes many of the known species, varieties, and hybrids of that genus is under the supervision of Mr. B. Y. Morrison, Senior Horticulturist.

Descriptions, as well as actual herbarium specimens of these bushes are being obtained in order that positive identification of undetermined Berberis may be made for the field forces locating such bushes.

Thirty-five new species in the form of seeds or cuttings were added to the collection during 1929.

Investigations of Factors Influencing Seed Germination and Survival of Barberry Seedlings

These investigations were begun in 1928 and continued in 1929 in the States of Michigan and Ohio by State Leaders John W. Baringer and Walter F. Reddy, respectively. Parallel investigational programs were outlined for each of these States. These dealt with longevity of barberry seed, date of maturity of seed, effect of physical and chemical treatment on seed germination, and growth of seed and survival of seedlings, under different ecological conditions. Because of the delayed

germination commonly exhibited by barberry seeds, these trials must continue for several years before final or definite conclusions can be made. However, some indications from the results of one year seem worthy of mention. Germination is distinctly better in well-drained soils than in poorly drained soils. There is some evidence that more seedlings develop in shaded habitats than in full sunlight under both good and poor drainage conditions. Barberry seed collected in the fall or following spring from bushes treated with salt in midsummer appear to be unaffected by the treatment in respect to viability. Seed collected on August 15, at the time of change of color of the berries from green to red, includes a significant percentage of viable seeds. However, practically three times as high a germination percentage was found for seed collected on October 15. Scarifying and tamping of soil about dead barberries has no noticeable effect on germination of seed present there. Likewise heating of the soil about such bushes has shown no effect. Since these data cover the experiments of only one year, they are subject to correction as reports are received on observations of the same plots in succeeding years.

PUBLICITY AND EDUCATIONAL ACTIVITIES

The task of getting people to favor a particular activity to the extent of actively talking and acting in the interests of the movement, requires a tremendous amount of productive thought and effort.

It is easy to understand why many worthy and decidedly practical campaigns of one sort or another have made slow progress. The reason in most cases is that even the people most vitally concerned, who would benefit directly, have not understood the necessity for the work or the methods used in solving the problem. The task of overcoming this lack of information, or misinformation, among the people when carrying on such an intensive disease control project as the barberry-eradication campaign makes necessary a counter program of education and enlightenment.

In the early days of the barberry-eradication campaign very few people knew what a common barberry bush looked like or why it should be killed. Barberry field agents were looked upon with suspicion and very little active support was given the movement by local citizens.

An educational and publicity campaign was begun in order to acquaint the general public with the necessity for the work, the nature and destructiveness of black stem rust, the identifying characteristics of the common barberry, and the part it plays in the life history of the rust fungus.

The publicity and educational phases are somewhat different in nature but they merge so that it is hard to say where one begins and the other ends if one considers them in relation to the barberry-eradication campaign as it is now conducted.

Early in the campaign a very general publicity program was promoted. Bulletins, circulars, and other informative material were placed in the hands of the public more or less at random. Specific groups and individuals were not dealt with as such and no effort was made to prepare material suitable to their particular needs. This procedure was not changed until about 1924.

With the assistance of the Conference for the Prevention of Grain Rust a definite, long-time program of education and publicity was organized and put in operation.

News services such as the Associated Press, the U. S. Department of Agriculture Press Service, and the State extension and agricultural press groups were used. Timely and accurate information began to appear

in the pages of the weekly and daily newspapers of the States. Since that time, thousands of columns of free space have been given for the purpose. During 1929 more than 1,150 articles were published in individual newspapers, 83 feature and general articles were used in farm journals or in the house organs of companies whose products were used in agricultural communities. Window displays were placed in 122 post offices, banks, county agent offices and stores. Three hundred and thirteen demonstrations were erected during the year at fairs, on streets, at festivals and in schools. A lantern slide series entitled, "The Common Barberry and Black Stem Rust", was shown 130 times and the barberry-eradication motion picture 10 times. Speakers presented the subject of common barberry eradication over the radio on nine occasions, at 439 schools, nine farm meetings, eight meetings of business men and 66 other meetings.

Every effort was made to prepare literature in the best possible form to suit the needs of the particular group or groups receiving it. The educational material is now specific to their requirements and the contacts have become very personal.

Accurate up-to-date mailing lists are kept in all of the local barberry offices. Names of county agents, farm bureau members, leading farmers, boys' and girls' club leaders, influential business men, teachers, newspaper editors, and similar groups are indexed separately. Personal contacts have been made with many of the individuals on these lists. It is the aim of those in charge of the campaign to have one or more well-informed "booster" for barberry eradication in every community. The only way to obtain this active cooperation is to circularize the important lists at least twice a year with personally addressed letters containing the latest information on the progress of the campaign. This is being done with great benefit to the work.

Schools and children's organizations to the number of 24,890 have been supplied with study materials in the form of lesson plans, colored illustrative material, laboratory exercises, and especially prepared bulletins for children. The boys' and girls' 4-H clubs, Boy Scouts, and similar groups also have been supplied with educational literature. Over 50 properties having about 700 common barberries were found in 1929 by girls and boys belonging to the Rust Busters' Club, an organization sponsored by the Conference for the Prevention of Grain Rust. A special bronze medal and a life membership in the Club are the rewards for finding and reporting to the proper authorities a property on which common barberry bushes are growing.

Efforts to have the story about rust and the common barberry included in school text books have been partially successful and several recently printed editions have contained this information. Among such books are: "First Course in Botany," by R. J. Pool and A. T. Evans; "A Laboratory Manual for First Course in Botany," by A. T. Evans; and "Nature in Agriculture," by W. L. Conway, H. N. Kauffman and W. H. Lancelot. Several of the State departments of education have included this subject in the curricula of their State elementary schools. Under the present plan for reaching students, the elementary and secondary schools, and all of the institutions of higher learning will receive new educational material once every three years. There are more than 90,000 schools in the 13 States of the barberry-eradication area. This phase of the campaign is of such great importance to the permanency of this disease-control program that any amount of time and effort expended is well rewarded.

In 1929, the U. S. Department of Agriculture distributed 560,638 copies of bulletins, lesson plans, circular letters, and other pieces of printed matter in the furthering of publicity and educational activities. The Conference for the Prevention of Grain Rust printed and distributed 462,659 pieces of printed matter, and the cooperating States 45,210. This makes a total of 1,068,507 pieces distributed by all three agencies in 1929. As a result of the improved and well-organized publicity and educational program now being carried on a constantly growing group of active cooperators is being formed. The position of the field agents is considerably improved because of the better understanding which the general public has of the relation of the common barberry to black stem rust and the necessity for the barberry-eradication campaign.

The following is a summary of the publicity and educational materials furnished and distributed by the U. S. Department of Agriculture, the Conference for the Prevention of Grain Rust, and the 13 cooperating States during the period from January 1 to December 31, 1929. A second table shows the comparable figures for the period from the beginning of the campaign to December 31, 1929.

Publicity and educational matter furnished and distributed by the U. S. Department of Agriculture, The Conference for the Prevention of Grain Rust, and the 13 cooperating States, in furthering the Barberry Eradication Campaign in the period from April 1, 1918, to December 31, 1929, inclusive.

Kind of Material	U. S. D. A.	CONFERENCE	STATES	TOTALS
Bulletins and Circulars	2,325,007	1,187,491	596,157	4,108,655
Multigraphed State Annual Reports	38,249	2,000	- -	40,249
Posters	350,355	214,757	3,000	568,112
Colored Plates	20,000	816,507	- -	836,507
Rust Loss Statements	- -	323,191	- -	323,191
Lesson Plans	138,945	5,377	- -	144,322
Lesson Plan Covers	- -	23,475	- -	23,475
Laboratory Outlines	450	62,953	- -	63,403
Microscope Slides (Sets of 3) ^{a/}	- -	6,821	- -	6,821
Envelopes for Grain Samples	67,263	4,684	- -	71,947
Rusted Straw Specimen Cards	79,574	4,388	- -	83,962
Barberry Specimen Envelopes ^{a/}	- -	262,775	- -	262,775
Life Cycle Models (Sets)	5	8	- -	13
School Display Sets	15	70	- -	85
Mimeographed Circulars	3,000	- -	- -	3,000
Mimeographed Radio Talks	17,000	- -	1,000	18,000
Circular Letters	382,304	173,395	7,100	562,799
Return Cards	51,571	387,026	2,000	440,597
Maps (Rotaprinted)	41,890	- -	- -	41,890
Reprints of Newspaper Articles	- -	115,162	- -	115,162
Hang-Me-Up Cards	73,500	- -	- -	73,500
Cross Word Puzzle	- -	3,000	- -	3,000
Dodgers	- -	72,350	- -	72,350
Calendar Cards	- -	130,202	- -	130,202
Official Personnel Lists, etc.	- -	48,500	- -	48,500
Warning Blotters	- -	111,155	- -	111,155
N.R.B. Buttons	- -	19,296	- -	19,296
Laboratory exercises	- -	78	- -	78
Word answer tests	3,149	- -	- -	3,149
Cartoons (rotaprints)	1,691	- -	- -	1,691
Life Cycle Cards	470	- -	- -	470
Loose Barberry Specimens	25	- -	- -	25
Literature Files	- -	19,339	- -	19,339
Course in Agriculture	- -	- -	5,000	5,000
Miscellaneous	19,839	186,302	- -	206,141
TOTALS	3,614,302	4,180,302	614,257	8,408,861

^{a/} U. S. D. A. and Conference, cooperatively.

Publicity and educational matter furnished and distributed by the U. S. Department of Agriculture, the Conference for the Prevention of Grain Rust, and the 13 cooperating States, in furthering the Barberry Eradication Campaign in the period from January 1, to December 31, 1929, inclusive.

Kind of Material	U. S. D. A.	Conference	State	Total
Bulletins and Circulars	269,098	4,525	30,110	303,733
Multigraphed State Annual Reports	28,949	2,000	-	30,949
Posters	-	25,552	-	25,552
Colored Plates	-	101,139	-	101,139
Rust Loss Statements	-	24,543	-	24,543
Lesson Plans	24,945	5,377	-	30,322
Lesson Plan Covers	-	17,475	-	17,475
Laboratory Outlines	450	33,584	-	34,034
Microscope Slides (Sets of 3) <u>a/</u>	-	3,592	-	3,592
Envelopes for Grain Samples	27,263	4,684	-	31,947
Rusted Straw Specimen Cards	19,574	4,388	-	23,962
Barberry Specimen Envelopes <u>a/</u>	-	46,188	-	46,188
Life Cycle Models (Sets)	5	7	-	12
School Display Sets	15	10	-	25
Mimeographed Radio Talks	-	-	1,000	1,000
Circular Letters	104,704	22,700	7,100	134,504
Return Cards	12,071	33,951	2,000	48,022
Maps (Rotaprinted)	22,890	-	-	22,890
Reprint of Newspaper Articles	-	29,599	-	29,599
Hang-Me-Up Cards	43,500	-	-	43,500
Calendar Cards	-	30,000	-	30,000
Warning BlotTERS	-	33,132	-	33,132
National Rust Busters Buttons	-	19,296	-	19,296
Laboratory Exercises	-	78	-	78
Word Answer Tests	3,149	-	-	3,149
Cartoons (rotaprinted)	1,691	-	-	1,691
Life Cycle Cards	470	-	-	470
Loose Barberry Specimens	25	-	-	25
Literature Files	-	19,339	-	19,339
Course in Agriculture	-	-	5,000	5,000
Miscellaneous	1,839	1,500	-	3,339
Totals	560,638	462,659	45,210	1,068,507

a/ U.S.D.A. and Conference, cooperatively.

SUMMARY FOR 1929

During the calendar year approximately 11 counties were covered by first survey and approximately 14.5 counties were surveyed a second time. Re-survey was completed in approximately 12.54 counties. Original bushes numbering 103,163 were found on 1,247 properties in all surveys during the year. These data include 30,146 original bushes found on 710 properties in second survey. A total of 446,070 seedlings was found on 234 properties as a result of all types of survey during the year. In resurvey only 1,247 sprouting bushes were found on 138 properties.

SUMMARIZED RESULTS FROM APRIL 1, 1918 to Dec. 31, 1929, INCLUSIVE.

In the 12 years the campaign has been in progress, an area equivalent to approximately 903 counties has been covered in the first survey, which included cities, towns, farmsteads, and, in very limited areas, timber and brush-covered land. The first survey of nearly all cities, towns, and villages in the entire 13 States of the eradication area has been completed.

Approximately 264 counties have received the second survey at the present time. Resurveys of infested areas have been made in most counties covered by first survey to destroy sprouts or seedlings which have appeared since the original eradication work.

Original bushes numbering 7,130,448 have been found on 79,554 properties in all surveys made thus far in the campaign. Of these, 7,129,751 have been destroyed on 79,511 properties.

In resurvey 316,799 sprouting bushes were found on 14,234 properties. Of these 316,538 have been destroyed. In all surveys, 10,700,496 seedlings have been found and 10,697,710 of these have been destroyed.

During the entire campaign a grand total of 18,147,743 original bushes, sprouting bushes, and seedlings have been found and 18,143,999 original bushes, sprouting bushes and seedlings have been destroyed.



FLOWERS
(yellow)



BERRIES
(bright red)

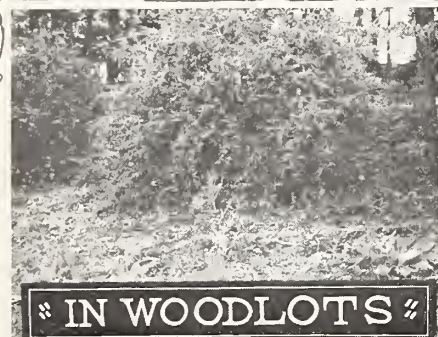
Where Barberry Bushes Grow



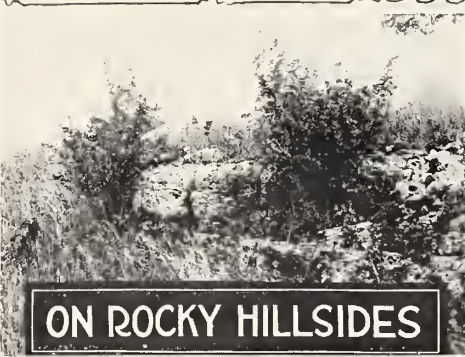
IN DOORYARDS



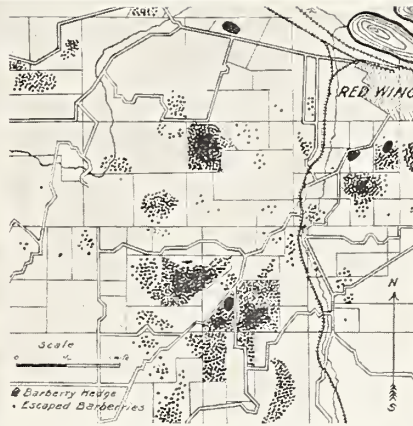
BIRDS CARRY BARBERRY SEEDS SEVERAL MILES, DROPPING THEM AMONG ROCKS AND IN OUT-OF-THE-WAY PLACES



IN WOODLOTS



ON ROCKY HILLSIDES



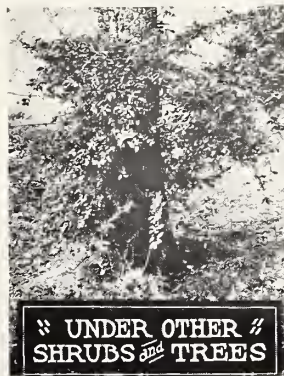
Barberries spread by birds



AS HEDGE FENCES



UNDER OTHER
SHRUBS and TREES





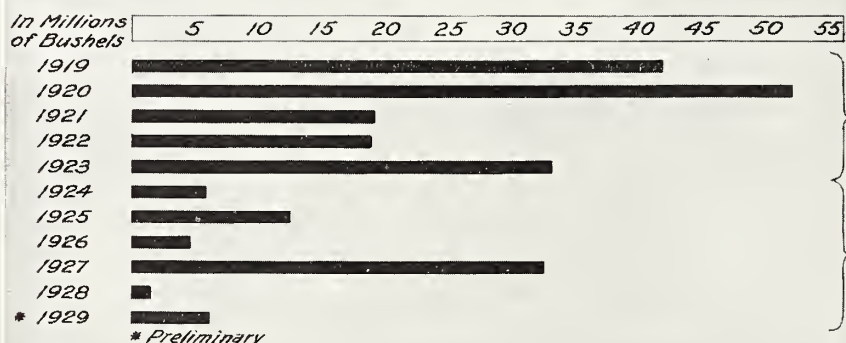
Salting a bush



Sprouts from a dug bush

Common Salt Kills Barberry Bushes and Prevents Sprouting

Wheat Losses in Barberry Eradication Area, 1919-1929



The average annual loss for the first five year period, 1919 to 1923, was approximately 33,000,000 bushels.

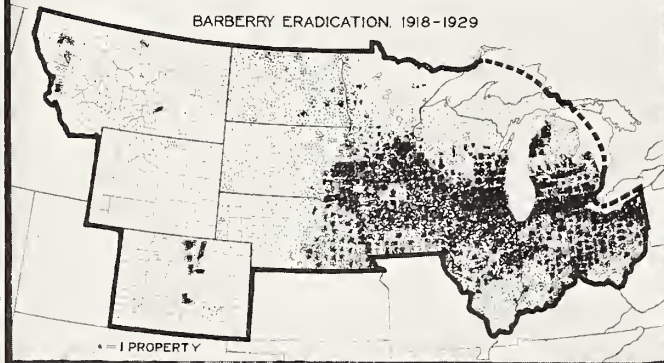
The average annual loss for the next six year period, 1924 to 1929, was approximately 10,500,000 bushels.

The losses to small grain crops caused by black stem rust have been reduced since the beginning of the barberry eradication campaign in 1918. The breeding of rust-resistant varieties, the use of early maturing varieties, and the sowing of crops early, have aided barberry eradication in this reduction.

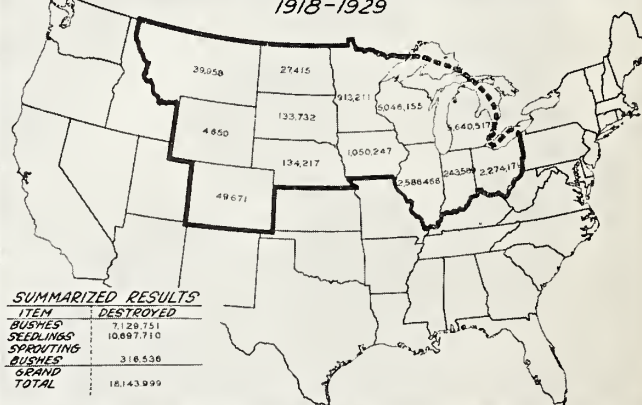
"BARBERRY ERADICATION PAYS"

RURAL PROPERTIES ON WHICH BARBERRY BUSHES WERE FOUND-ALL SURVEYS

BARBERRY ERADICATION, 1918-1929



NUMBERS OF BARBERRY BUSHES AND SEEDLINGS DESTROYED 1918-1929



SUMMARIZED RESULTS	
ITEM	DESTROYED
BUSHES	1,129,151
SEEDLINGS	10,697,710
SPROUTING BUSHES	318,536
TOTAL	18,143,999

FIRST SURVEY, BUSHES AND SEEDLINGS, January 1 to December 31, 1929.

Table 2. Data showing, by States, the number of barberry bushes found and destroyed in all surveys, and the number of seedlings found and destroyed in first and second surveys in the calendar year January 1 to December 31, 1929.

State	Number of bushes found -			Number of bushes destroyed:			Number of seedlings				
	In cities:	In country:	and towns:	Total	Dug	Treated	Total	Found	Dug	Treated	Total
Colo.	95	119	167	262	106	159	265	1,816	1,150	666	1,816
Ill.	181	673	836	1,017	220	797	1,017	357	132	225	357
Ind.	34	111	189	223	47	179	226	861	4	857	861
Iowa	235	5,377	5,971	6,206	34	6,172	6,206	7,453	0	7,453	7,453
Mich.	141	62,594	62,606	62,747	96	62,651	62,747	380,300	325	379,975	380,300
Minn.	114	399	579	693	163	530	693	2,546	189	2,357	2,546
Mont.	3	438	445	448	4	449	453	17	117	0	117
Nebr.	181	195	339	520	142	378	520	891	310	581	891
N. Dak.	12	0	153	165	37	128	165	470	60	410	470
Ohio	290	3,488	3,802	4,092	527	4,565	5,092	30,881	6,097	24,784	30,881
S. Dak.	22	168	210	232	19	213	232	500	409	91	500
Wis.	195	26,301	26,363	26,558	513	26,056	26,569	19,978	848	19,130	19,978
Wyo.	0	0	0	0	82	0	82	0	0	0	0
Totals	1,503	99,863	101,660	103,163	1,990	102,277	104,267	446,070	9,641	436,529	446,170

FIRST SURVEY, PROPERTIES, April 1, 1918, to December 31, 1929.

Table 3. Data showing, by States, the number of properties on which barberry bushes were found and destroyed in all surveys, and the number of properties upon which seedlings were found and destroyed in first and second surveys, from April 1, 1918, to December 31, 1929.

State	Number of : counties	Number of properties on which bushes were found -	Total number of proper-: Number of properties on which ties cleared of bushes : seedlings were -									
		In country	Having :	Total in :	Dug :	Treated:	Total :	Found:	Dug :	Treated:	Total	
		: cities:	: towns:	: cities & :	: cities :	: country :						
		: bushes:										
Colo.	58.00	1,610	123	265	1,875	1,711	163	1,874	124	23	101	124
Ill.	89.00	11,299	1,569	3,737	15,036	12,966	2,070	15,036	361	275	86	361
Ind.	92.00	3,776	471	1,496	5,272	4,632	633	5,270	154	67	83	150
Iowa	99.00	7,217	1,237	3,339	10,556	9,166	1,388	10,554	457	158	299	457
Mich.	66.37	5,258	2,330	6,184	11,442	9,471	1,971	11,442	885	562	323	885
Minn.	87.00	3,228	746	2,368	5,596	5,025	571	5,596	544	408	136	544
Mont.	55.00	244	80	179	423	321	190	421	45	38	7	45
Nebr.	93.00	3,244	216	967	4,211	3,705	506	4,211	94	48	46	94
N. Dak.	53.00	569	2	382	951	779	172	951	20	2	18	20
Ohio	88.00	8,103	1,570	3,880	11,983	10,192	1,789	11,981	1,071	501	570	1,071
S. Dak.	69.00	529	191	774	1,303	839	464	1,303	109	92	17	109
Wis.	71.00	7,158	1,836	3,652	10,810	9,199	1,578	10,777	600	297	296	593
Wyo.	8.12	78	1	18	96	57	8	95	7	7	0	7
Total	929.29	52,313	10,372	27,241	79,554	68,093	11,418	79,511	4,467	2,478	1,982	4,460

Table 4. Data showing, by States, the number of barberry bushes found and destroyed in all surveys, and the number of seedlings found and destroyed in first and second surveys, from April 1, 1918 to December 31, 1929.

State	Number of bushes found -			Number of bushes destroyed			Number of seedlings -				
	In cities: and towns:	In country	Total	Total	Dug	Treated	Found	Dug	Treated	Total	
Colo.	19,859	3,626	5,905	25,764	24,115	1,648	25,763	16,896	1,862	15,034	16,896
Ill.	115,682	227,124	271,743	367,625	199,028	168,597	387,625	2,176,217	472,298	1,783,919	2,176,217
Ind.	78,003	106,912	122,416	200,419	99,360	101,056	200,416	23,176	3,609	19,567	23,176
Iowa	652,339	80,196	169,777	822,107	775,264	46,837	822,101	197,197	32,425	164,772	197,197
Mich.	55,235	635,125	717,623	772,858	380,631	392,227	772,858	4,863,797	1,445,807	3,417,990	4,863,797
Minn.	593,179	92,826	205,391	798,570	781,437	17,133	798,570	62,279	25,654	36,625	62,279
Mont.	7,357	2,953	5,776	13,133	10,855	2,270	13,125	21,557	17,779	3,787	21,557
Nebr.	73,539	9,656	26,180	99,719	91,803	7,916	99,719	17,547	6,506	11,041	17,547
N. Dak.	14,682	150	8,881	23,563	19,963	3,610	23,563	1,293	210	1,083	1,293
Ohio	220,324	167,228	188,351	408,675	251,789	156,875	408,664	1,846,729	135,817	1,710,912	1,846,729
S. Dak.	24,052	21,624	37,488	61,540	49,224	12,316	61,540	29,016	25,268	3,728	29,016
Wis.	281,555	3,218,244	3,230,732	3,512,287	3,353,823	157,883	3,511,706	1,444,739	176,765	1,265,188	1,441,953
Wyo.	3,951	1	237	4,188	4,054	47	4,101	53	53	3	53
Total	2,139,948	4,565,065	4,990,500	7,130,448	6,041,336	1,088,415	7,129,751	10,700,496	2,344,064	8,353,646	10,697,710

SECOND SURVEY, PROPERTIES, January 1 to December 31, 1929.

Table 5. Data showing, by States, the number of properties on which barberry bushes and seedlings were found and destroyed on second survey in the barberry eradication campaign in the calendar year January 1 to December 31, 1929.

State	Number of properties on which bushes were found -										Total number of proper--: ties cleared of bushes:										Number of properties on which seedlings were -										
	: counties:					: In country:					: cities:					: towns:					: Found:					: Treated:					
	: surveyed:					: Having:					: escaped:					: cities &:					: Total:					: Dug:					
	: : : : :					: : : : :					: : : : :					: : : : :					: : : : :					: : : : :					
Colorado	2,500	31	12	27	58	37	21	58	10	4	6	10	4	6	10	4	6	10	4	6	10	4	6	10	4	6	10	4	6	10	
Illinois	1,052	9	14	19	28	5	23	28	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	
Indiana	0	14	10	19	33	17	17	34	5	3	2	5	3	2	5	3	2	5	3	2	5	3	2	5	3	2	5	3	2	5	
Iowa	0	1	70	70	71	7	64	71	14	0	14	14	0	14	14	0	14	0	14	0	14	0	14	0	14	0	14	0	14	0	
Michigan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Minnesota	1,530	19	65	78	97	25	72	97	12	4	8	12	4	8	12	12	4	8	12	4	8	12	4	8	12	4	8	12	4	8	12
Montana	1,190	3	16	17	20	2	18	20	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1
Nebraska	3,200	9	20	40	49	2	47	49	8	5	3	8	5	3	8	8	5	3	8	5	3	8	5	3	8	5	3	8	5	3	8
North Dakota	.950	0	0	2	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ohio	1,340	122	27	98	220	181	39	220	28	24	4	28	24	4	28	28	24	4	28	24	4	28	24	4	28	24	4	28	24	4	28
South Dakota	2,370	4	1	9	13	2	11	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wisconsin	.300	51	67	68	119	49	70	119	30	7	23	30	7	23	30	119	70	23	30	7	23	30	7	23	30	7	23	30	7	23	30
Wyoming	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14,432	263	302	447	710	326	383	711	109	48	61	109	48	61	109	711	383	61	109	48	61	109	48	61	109	48	61	109	48	61	109

SECOND SURVEY. BUSHES AND SEEDLINGS, January 1 to December 31, 1929.

Table 6. Data showing, by States, the number of barberry bushes and seedlings found and destroyed on second survey in the barberry eradication campaign in the calendar year January 1 to December 31, 1929.

State	Number of bushes found -			Number of bushes destroyed			Number of seedlings -				
	In cities:	In country:	Total:	Dug:	Treated:	Total:	Found:	Dug:	Destroyed:	Total	
and towns:	Escaped:	Total:	Dug:	Treated:	Total:	Found:	Dug:	Treated:	Destroyed:	Total	
Colorado	71	96	144	215	81	134	215	1,741	1,150	591	1,741
Illinois	15	313	320	335	53	282	335	100	0	100	100
Indiana	23	55	124	147	31	119	150	279	4	275	279
Iowa	11	1,604	1,605	1,616	8	1,608	1,616	1,877	0	1,877	1,877
Michigan	0	0	0	0	0	0	0	0	0	0	0
Minnesota	106	321	499	505	155	450	505	2,546	189	2,357	2,546
Montana	3	438	445	448	4	444	448	17	17	0	17
Nebraska	174	195	289	463	141	322	463	791	310	481	791
North Dakota	0	0	41	41	25	16	41	60	60	0	60
Ohio	192	242	425	617	349	268	617	7,661	6,092	1,569	7,661
South Dakota	5	3	37	42	3	39	42	0	0	0	0
Wisconsin	141	25,450	25,476	25,617	265	25,352	25,617	19,537	739	18,798	19,537
Wyoming	0	0	0	0	0	0	0	0	0	0	0
Total	741	28,717	29,405	30,146	1,115	29,034	30,149	34,609	8,561	26,048	34,609

Table 7. Data showing, by States, the number of properties on which barberry bushes and seedlings were found and destroyed on second survey in the barberry eradication campaign from January 1, 1922, to December 31, 1929.

	Number of properties on which bushes were found -		Total number of proper--: Number of properties on which		ties cleared of bushes :		seedlings were -		Destroyed			
State	counties:	In country :	Total in:	cities & :	Dug :	Treated :	Found :	Dug :				
	survived:	and towns:escaped:	Total :	cities & :	Dug :	Treated :	Total :	Found :	Dug :			
	counties:	bushes:	country:	country:	country:	country:	country:	country:	country:			
Colorado	26,240	59	74	122	181	63	118	181	21	4	17	21
Illinois	9,745	545	502	717	1,262	684	578	1,262	168	131	37	168
Indiana	10,250	223	83	211	434	270	164	434	39	16	23	39
Iowa	27,190	88	336	543	631	151	479	630	129	34	95	129
Michigan	3,830	62	44	86	148	94	54	148	9	9	0	9
Minnesota	51,550	110	246	566	676	254	422	676	101	29	72	101
Montana	11,390	5	28	32	37	7	29	36	5	4	1	5
Nebraska	35,450	94	150	394	488	92	396	488	63	38	25	63
North Dakota	35,850	44	0	90	134	31	103	134	4	0	4	4
Ohio	3,500	140	27	105	245	205	40	245	28	24	4	28
South Dakota	32,990	58	56	218	276	44	232	276	13	7	6	13
Wisconsin	13,460	307	783	966	1,273	452	821	1,273	350	177	173	350
Wyoming	2,700	4	0	4	8	1	7	8	0	0	0	0
Totals	264,145	1,739	2,329	4,054	5,793	2,348	3,443	5,791	930	473	457	930

Table 8. Data showing, by States, the number of barberry bushes and seedlings found and destroyed on second survey in the barberry eradication campaign from January 1, 1922, to December 31, 1929.

State	Number of bushes found -		Number of bushes destroyed		Number of seedlings -						
	In cities and towns	In country	Dug	Treated	Found	Destroyed					
	Escaped	Total	Dug	Total	Found	Treated					
Colorado	180	655	786	966	134	832	966	6,161	1,150	5,011	6,161
Illinois	3,004	96,778	98,328	101,332	22,503	78,829	101,332	51,793	41,423	10,370	51,793
Indiana	727	1,922	2,326	3,053	804	2,249	3,053	6,751	2,052	4,699	6,751
Iowa	1,027	8,925	12,529	13,556	1,143	12,411	13,554	120,011	4,087	115,924	120,011
Michigan	130	681	796	926	314	612	926	1,045	995	50	1,045
Minnesota	866	5,061	8,328	9,194	2,296	6,898	9,194	7,910	850	7,060	7,910
Montana	5	838	855	860	78	781	859	1,546	546	1,000	1,546
Nebraska	719	3,692	6,544	7,263	1,672	5,591	7,263	9,133	5,256	3,877	9,133
North Dakota	267	0	1,867	2,134	368	1,766	2,134	100	60	40	100
Ohio	251	242	456	707	437	270	707	7,661	6,092	1,569	7,661
South Dakota	483	383	2,047	2,530	413	2,117	2,530	1,392	1,129	263	1,392
Wisconsin	1,082	123,131	124,069	125,151	18,610	106,541	125,151	150,563	48,639	101,924	150,563
Wyoming	5	0	41	46	1	45	46	0	0	0	0
Totals	8,746	242,308	258,972	267,718	48,773	218,942	267,715	364,066	112,279	251,787	364,066

RESERVITY, PROPERTIES, January 1, to December 31, 1929.

Table 9. Data showing, by States, the number of properties on which sprouting bushes and seedlings were found and destroyed on resurvey in the barberry eradication campaign in the calendar year January 1 to December 31, 1929.

State	Number of properties on which sprouting bushes were found -		Total number of properties: cleared of sprouting bushes		Number of properties on which seedlings were -		Destroyed
	In country	Total in:	Treated:	Total:	Found:	Dug:	
	In cities:	towns:	escaped:	and towns:	escaped:	and towns:	
Colorado	9	0	0	9	0	0	0
Illinois	0	1	1	0	1	0	0
Indiana	0	9	9	1	8	0	4
Iowa	0	0	0	0	0	0	0
Michigan	0	0	0	0	0	0	0
Minnesota	2	7	9	7	2	0	0
Montana	3	2	5	0	5	0	0
Nebraska	1	3	9	1	9	0	0
North Dakota	5	5	10	9	1	0	0
Ohio	37	16	22	41	18	12	11
South Dakota	1	1	8	1	8	7	2
Wisconsin	6	11	11	9	9	13	13
Wyoming	0	0	0	0	0	0	0
Totals	64	46	74	138	61	139	36

RESURVEY, SPROUTING BUSHES AND SEEDLINGS, January 1 to December 31, 1929.

Table 10. Data showing, by States, the number of sprouting bushes and seedlings found and destroyed on resurvey in the barberry eradication campaign in the calendar year January 1 to December 31, 1929.

State	Number of sprouting bushes found -:				Number of sprouting bushes:				Number of seedlings -			
	In cities:		In country:		destroyed		Total		Total		Total	
	Escaped	Total	Escaped	Total	Dug	Treated	Total	Found	Dug	Treated	Total	Total
Colorado	15	0	0	15	15	0	15	0	0	0	0	0
Illinois	0	1	1	1	0	1	1	0	0	0	0	0
Indiana	0	102	102	102	0	102	102	555	0	555	555	555
Iowa	0	0	0	0	0	0	0	0	0	0	0	0
Michigan	0	0	0	0	0	0	0	0	0	0	0	0
Minnesota	3	19	33	35	29	7	36	0	0	0	0	0
Montana	10	0	2	12	0	12	12	0	0	0	0	0
Nebraska	1	33	71	72	1	71	72	0	0	0	0	0
North Dakota	30	0	46	76	64	12	76	0	0	0	0	0
Ohio	58	768	778	835	64	772	836	3,319	50	3,269	3,319	3,319
South Dakota	2	1	24	26	2	24	26	494	403	91	494	494
Wisconsin	22	49	49	71	28	44	72	3,721	0	3,721	3,721	3,721
Wyoming	0	0	0	0	0	0	0	0	0	0	0	0
Totals	141	973	1,106	1,247	203	1,045	1,248	8,089	453	7,636	8,089	8,089

RESURVEY, PROPERTIES, April 1, 1918 to December 31, 1929.

Table 11. Data showing, by States, the number of properties on which sprouting bushes and seedlings were found and destroyed on resurvey in the barberry-eradication campaign from April 1, 1918, to December 31, 1929.

State	Number of properties on which sprout--										Total number of properties :Number of properties on which									
	ing bushes were found--					: cleared of sprouting bushes:					seedlings were--					Destroyed				
	In country	Total in	cities &	Dug	Treated	Total	Found	Dug	Treated	Found	Dug	Treated	Found	Dug	Treated	Found	Dug	Treated	Found	Dug
	and towns:escaped	Total	country	country	country	country	country	country	country	country	country	country	country	country	country	country	country	country	country	country
	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes	bushes
Colorado	1,454	114	193	1,647	1,427	220	1,647	106	19	87	106	19	87	106	19	87	106	19	87	106
Illinois	472	475	875	1,347	634	713	1,347	429	345	84	429	345	84	429	345	84	429	345	84	429
Indiana	184	147	283	467	319	146	465	53	16	37	53	16	37	53	16	37	53	16	37	53
Iowa	378	383	1,136	1,514	738	776	1,514	285	146	139	285	146	139	285	146	139	285	146	139	285
Michigan	146	116	291	437	375	62	437	195	191	4	195	191	4	195	191	4	195	191	4	195
Minnesota	759	694	1,446	2,205	1,691	514	2,205	2,281	2,124	157	2,281	2,124	157	2,281	2,124	157	2,281	2,124	157	2,281
Montana	127	6	58	185	163	22	185	23	20	3	23	20	3	23	20	3	23	20	3	23
Nebraska	220	38	452	672	367	305	672	8	6	2	8	6	2	8	6	2	8	6	2	8
North Dakota	328	0	256	584	258	326	584	6	0	6	6	0	6	6	0	6	6	0	6	6
Ohio	1,458	297	1,043	2,501	2,145	356	2,501	728	552	176	728	552	176	728	552	176	728	552	176	728
South Dakota	342	41	361	703	514	189	703	97	49	48	97	49	48	97	49	48	97	49	48	97
Wisconsin	927	697	1,003	1,930	1,363	564	1,927	318	175	143	318	175	143	318	175	143	318	175	143	318
Wyoming	32	0	10	42	31	7	38	7	7	0	7	7	0	7	7	0	7	7	0	7
Totals	6,827	3,008	7,407	14,234	10,025	4,200	14,225	4,536	3,650	.886	4,536	3,650	.886	4,536	3,650	.886	4,536	3,650	.886	4,536

Table 12. Data showing, by States, the number of sprouting bushes and seedlings found and destroyed on resurvey in the barberry-eradication campaign from April 1, 1918, to December 31, 1929.

Totals	78,732	148,802	238,067	316,799	180,343	136,195	316,538	3,013,362	1,248,222	1,765,140	3,013,362
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ERADICATION, 1929.

Table 13. Data showing, by States, the number of original bushes, sprouting bushes, and seedlings dug and treated, and the total number destroyed by both methods, from January 1 to December 31, 1929.

	Original Bushes			Sprouting Bushes			Seedlings			Totals		
	Dug	Treated	Total	Dug	Treated	Total	Dug	Treated	Total	Dug	Treated	Total
Colorado	106	159	265	15	0	15	1,150	666	1,816	1,271	825	2,096
Illinois	220	797	1,017	0	1	1	132	225	357	352	1,023	1,375
Indiana	47	179	226	0	102	102	4	857	861	51	1,138	1,189
Iowa	34	6,172	6,206	0	0	0	0	7,453	7,453	34	13,625	13,659
Michigan	96	62,651	62,747	0	0	0	325	379,975	380,300	421	442,626	443,047
Minnesota	163	530	693	29	7	36	189	2,357	2,546	381	2,894	3,275
Montana	4	449	453	0	12	12	117	0	117	121	461	582
Nebraska	142	378	520	1	71	72	310	581	891	453	1,030	1,483
North Dakota	37	128	165	64	12	76	60	410	470	161	550	711
Ohio	527	4,565	5,092	64	772	836	6,097	24,784	30,881	6,688	30,121	36,809
South Dakota	19	213	232	2	24	26	409	91	500	430	328	758
Wisconsin	513	26,056	26,569	28	44	72	848	19,130	19,978	1,389	45,230	46,619
Wyoming	82	0	0	0	0	0	0	0	0	82	0	82
Totals	1,990	102,277	104,267	203	1,045	1,248	9,641	456,529	446,170	11,834	539,851	551,685

ERADICATION, 1918 to 1929.

Table 14. Data showing, by States, the number of original bushes, sprouting bushes, and seedlings dug and treated and the total number destroyed by both methods from April 1, 1918 to December 31, 1929.

State	Original bushes			Sprouting bushes			Seedlings			Totals	
	Dug	Treated	Total	Dug	Treated	Total	Dug	Treated	Total	Dug	Treated
Colo.	24,115	1,648	25,763	5,171	1,841	7,012	1,862	15,034	16,896	31,111	18,523
Ill.	199,028	188,597	387,625	10,406	12,215	22,624	472,298	1703,919	2,176,217	681,734	1904,732
Ind.	99,360	101,056	200,416	17,942	2,055	19,997	3,609	19,567	23,176	120,911	122,678
Iowa	775,264	46,837	822,101	15,915	15,034	30,949	32,425	164,772	197,197	823,604	226,643
Mich.	360,631	392,227	772,858	2,231	1,631	3,862	1445,807	3417,990	4,863,797	1828,669	3811,848
Minn.	781,437	17,133	798,570	40,908	11,454	52,362	25,654	36,625	62,279	847,999	65,212
Mont.	10,855	2,270	13,125	5,070	206	5,276	17,770	3,787	21,557	33,695	6,263
Nebr.	91,803	7,916	99,719	12,577	4,374	16,951	6,506	11,041	17,547	110,885	23,331
N. Dak.	19,953	3,610	23,563	379	2,180	2,559	210	1,083	1,293	20,542	6,873
Ohio	251,789	156,875	408,664	13,135	5,643	18,778	135,817	1,710,912	1,846,729	400,741	1973,430
S. Dak.	49,224	12,316	61,540	36,632	6,544	43,176	25,288	3,728	29,016	111,144	22,588
Wis.	3,353,823	157,883	3,511,706	19,500	72,996	92,496	176,765	1,265,188	1,441,953	3,550,088	1496,067
Wyo.	4,054	47	4,101	475	21	496	53	0	53	4,582	68
Totals	6,041,336	1068,415	7,129,751	180,343	136,195	316,538	2344,064	8,353,646	10697,710	9578,256	18143,999

CHEMICAL TREATMENT, 1929.

Table 15. Data showing, by States, the number of properties on which barberry bushes and sproutings treated from January 1 to December 31, 1929.

State	Number treated													
	: With Salt							: With sodium arsenite: With Kerosene						
	: Proper-:	: Bushes	: Seed-:	: Seed-:	: Proper-:	: Seed-:	: Proper-:	: Proper-:	: Bushes	: Seedlings:	: Seedlings:	: Proper-:	: Total	
: ties :	: ties :	: lings :	: lings :	: ties :	: ties :	: Bushes:	: lings:	: ties :	: ties :	: Bushes :	: Seedlings:	: ties :	: Bushes :	: Seedlings
Colorado	21	150	666	0	0	0	0	2	9	0	0	23	159	666
Illinois	62	770	225	0	0	0	0	10	28	0	0	72	798	225
Indiana	33	244	857	0	0	0	0	3	37	0	0	36	281	857
Iowa	214	6,123	7,401	4	49	52	0	0	0	0	0	218	6,172	7,453
Michigan	54	62,651	379,975	0	0	0	0	0	0	0	0	54	62,651	379,975
Minnesota	81	537	2,357	0	0	0	0	0	0	0	0	81	537	2,357
Montana	24	461	0	0	0	0	0	0	0	0	0	24	461	0
Nebraska	24	271	378	0	0	0	0	35	178	203	59	449	581	
North Dakota	4	140	410	0	0	0	0	0	0	0	4	140	410	
Ohio	139	5,325	24,784	0	0	0	0	3	12	0	142	5,337	24,784	
South Dakota	27	237	91	0	0	0	0	0	0	0	27	237	91	
Wisconsin	98	26,100	19,130	0	0	0	0	0	0	0	98	26,100	19,130	
Wyoming	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	781	103,009	436,274	4	49	52	53	264	203	838	103,322	436,529		

Table 16. Data showing, by States, the number of properties on which barberry bushes and sprouting barberry bushes were treated with chemicals, and the number of bushes, sprouting bushes, and seedlings treated from September 1, 1921, to December 31, 1929.

State	Number treated--														
	With salt			With sodium arsenite			With kerosene			Total					
	Proper- ties	Bushes	Seed- lings	Proper- ties	Bushes	Seed- lings	Proper- ties	Bushes	Seed- lings	Proper- ties	Bushes	Seed- lings	Proper- ties	Bushes	Seed- lings
Colorado	372	3,396	15,034	0	0	0	11	93	0	383	3,489	15,034	0	383	3,489
Illinois	2,734	198,777	1,703,919	34	839	0	15	1,197	0	2,783	200,813	1,703,919	0	2,783	200,813
Indiana	749	102,911	19,524	0	0	0	35	200	43	784	103,111	19,567	43	784	103,111
Iowa	2,130	60,373	164,709	4	49	52	30	1,449	11	2,164	61,871	164,772	11	2,164	61,871
Michigan	1,657	323,077	3,290,441	239	8,594	29,911	137	62,187	97,638	2,033	393,858	3,417,990	97,638	2,033	393,858
Minnesota	1,046	28,286	35,968	25	85	102	14	216	555	1,085	28,587	36,625	555	1,085	28,587
Montana	121	2,451	3,587	0	0	0	1	25	200	122	2,476	3,787	200	122	2,476
Nebraska	478	8,631	9,927	0	0	0	333	3,659	1,114	811	12,290	11,041	1,114	811	12,290
North Dakota	477	5,723	1,083	21	67	0	0	0	0	498	5,790	1,083	0	498	5,790
Ohio	1,844	150,315	1,565,028	10	1,069	59,300	291	11,134	86,584	2,145	162,518	1,710,912	86,584	2,145	162,518
South Dakota	645	18,847	3,712	0	0	0	8	13	16	653	18,860	3,728	16	653	18,860
Wisconsin	1,791	225,054	1,263,486	350	5,824	1,702	1	1	0	2,142	230,879	1,265,188	0	2,142	230,879
Wyoming	15	68	0	0	0	0	0	0	0	15	68	0	0	15	68
Totals	14,059	1,127,909	8,076,418	683	16,527	91,067	876	80,174	186,161	15,618	1,224,610	8,353,646	186,161	15,618	1,224,610

CHEMICALS, QUANTITIES USED, January 1 to December 31, 1929.

Table 17. Data showing, by States, quantities of chemicals used in the barberry-eradication campaign from January 1 to December 31, 1929.

State	Salt (Tons)		Sodium Arsenite (Gals.)		Kerosene (Gallons)	
	Furnished by--		Furnished by--		Furnished by--	
	Property:	State	Conf.:	Total	Conference: USDA	Total
	owner	agency	P.G. Rust: USDA	P.G. Rust:	Owner	USDA
Colorado	0	0	0	.720	0	0
Illinois	0	1.137	0	9.365	0	0
Indiana	0	0	0	1.404	0	0
Iowa	0	0	0	27.584	0	37.625
Michigan	0	0	0	56.880	0	0
Minnesota	.020	0	0	4.584	0	0
Montana	0	0	0	1.220	0	0
Nebraska	0	0	0	3.190	0	0
North Dakota	.300	.900	0	.060	0	0
Ohio	0	41.390	0	4.370	0	0
South Dakota	0	0	0	1.500	0	0
Wisconsin	0	22.900	0	62.502	0	0
Wyoming	0	0	0	0	0	0
Totals	.320	66.327	0	173.379	0	37.625
				240.026	0	890.50
					0	890.50
					0	890.50

1/ 10 pounds sodium chlorate
2/ 9 gallons kerosene

CHEMICALS, QUANTITIES USED, September 1, 1921, to December 31, 1929.

Table 18. Data showing, by States, quantities of chemicals used in the barberry eradication campaign from September 1, 1921, to December 31, 1929.

State	Salt (Tons)			Sodium Arsenite (Gals.)			Kerosene (Gallons)		
	Property:	State	Agency:	Confer-:	Total	Confer-:	Total	Confer-:	Total
	owner	agency	g. Rust:	ence P.:U.S.D.A.	g. Rust:	ence P.:U.S.D.A.	g. Rust:	U.S.D.A.	Total
Colorado	0	0	0	8,640	8,640	0	0	4.00	1/ 90,000 94,000
Illinois	.750	58.954	31.00	397.415	488.119	0	77,000	0	479,000 479,000
Indiana	.825	0	0	68.294	69.119	0	0	0	283,000 283,000
Iowa	44.200	0	20.69	192.334	257.224	0	41,125	404.25	692,500 1,095,750
Michigan	.030	0	6.49	551.760	560.280	175.60	129,300	0	11,341,000 11,341,000
Minnesota	3.130	.840	9.21	73.424	86.604	0	23,250	0	2/ 43,650 43,650
Montana	.120	0	0	8,700	8,820	0	0	0	30,000 30,000
Nebraska	.155	0	8.55	23,270	31,976	0	0	151.50	5,093,500 5,245,000
N. Dakota	18.880	5.900	0	5,490	30,270	0	7,000	0	0 0
Ohio	3.040	892.160	0	28,610	923,810	16.20	30,100	279.00	3/ 6,635,000 6,914,000
S. Dakota	14.470	0	17.35	17,150	49,470	0	0	0	22,000 22,000
Wisconsin	.250	370.728	70.00	91,290	532,268	408.00	190,000	0	4/ .375 .375
Wyoming	.050	0	0	.280	.330	0	0	0	0 0
Totals	85.901	1,328.582	165.791	466,657	3,046,930	599.80	497,775	868.75	24,710,025 25,546,775

Furnished by State

1/ 10 pounds sodium chlorate

2/ 10 gallons of drip oil

3/ 4934 gallons kerosene

4/ .375 gallons carbon bisulphide

GRAND SUMMARY. ORIGINAL BUSHES, SPROUTING BUSHES, AND SEEDLINGS, January 1 to December 31, 1929.

Table 19. Data showing, by States, the number of bushes, sprouting bushes, and seedlings found and destroyed in all surveys in the barberry eradication campaign, from January 1 to December 31, 1929.

State	Original bushes:		Sprouting bushes:		Seedlings:		Grand Total	
	Found	Destroyed	Found	Destroyed	Found	Destroyed	Found	Destroyed
Colorado	262	255	15	15	1,816	1,816	2,093	2,096
Illinois	1,017	1,017	1	1	357	357	1,375	1,375
Indiana	223	226	102	102	861	861	1,186	1,189
Iowa	6,206	6,206	0	0	7,453	7,453	13,659	13,659
Michigan	62,747	62,747	0	0	380,300	380,300	443,047	443,047
Minnesota	693	693	36	36	2,546	2,546	3,275	3,275
Montana	448	453	12	12	17	117	477	582
Nebraska	520	520	72	72	891	891	1,483	1,483
North Dakota	155	155	76	76	470	470	711	711
Ohio	4,092	5,092	836	836	30,881	30,881	35,809	36,809
South Dakota	232	232	25	25	500	500	758	758
Wisconsin	26,556	26,559	71	72	19,978	19,978	46,607	46,619
Wyoming	0	82	0	0	0	0	0	82
Totals	103,163	104,367	1,247	1,248	446,070	448,170	550,460	551,685

GRAND SUMMARY. ORIGINAL BUSHES, SPROUTING BUSHES, AND SEEDLINGS, 1918-1929.

Table 20. Data showing, by States, the number of bushes, sprouting bushes, and seedlings found and destroyed in all surveys in the barberry eradication campaign, from April 1, 1918 to December 31, 1929.

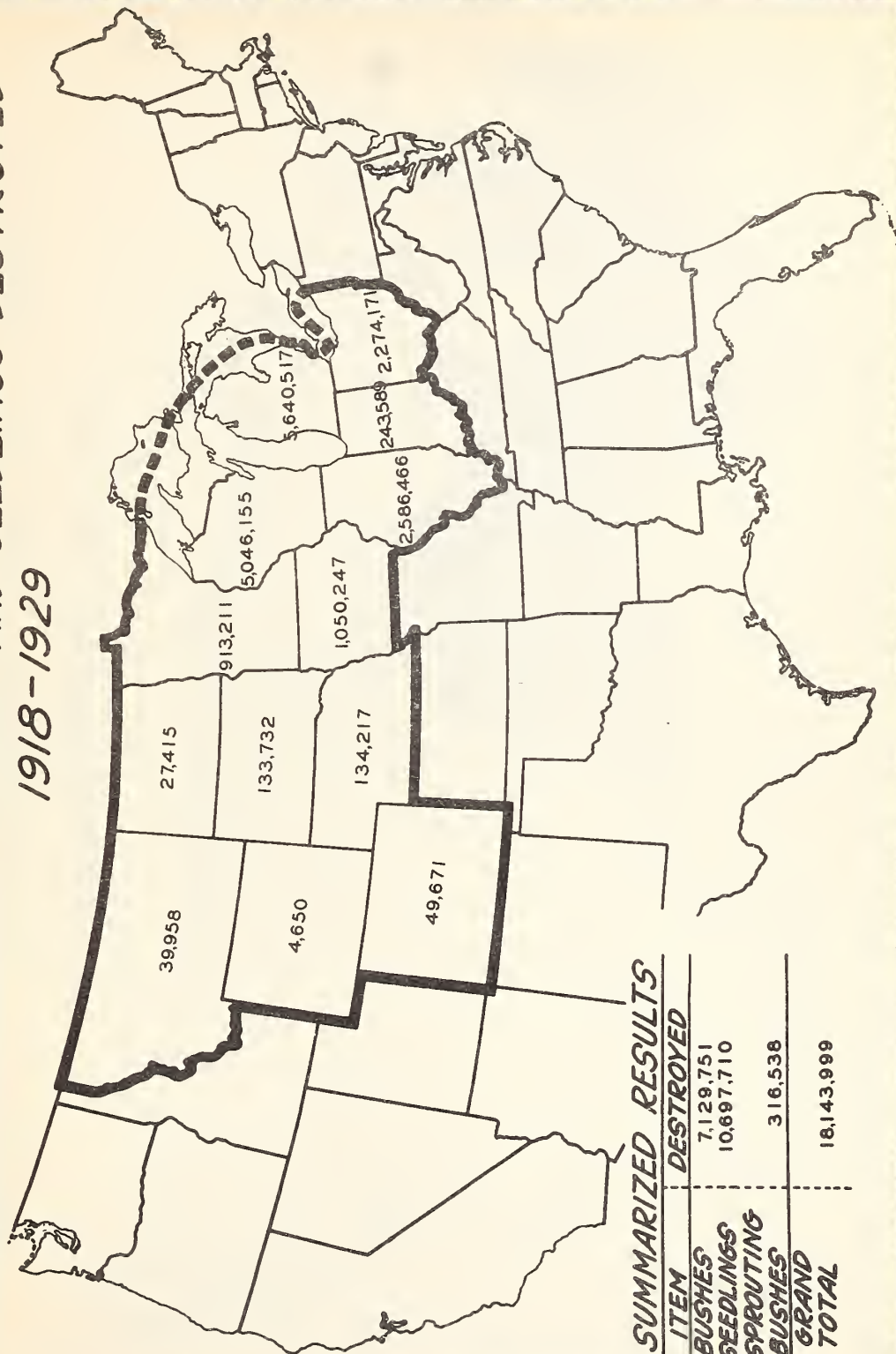
State	Original bushes		Sprouting bushes		Seedlings		Grand Total	
	Found	Destroyed	Found	Destroyed	Found	Destroyed	Found	Destroyed
Colorado	25,764	25,763	7,012	7,012	16,896	16,896	49,672	49,671
Illinois	387,625	387,625	22,624	22,624	2,176,217	2,176,217	2,586,466	2,586,466
Indiana	200,419	200,416	19,999	19,997	23,176	23,176	243,594	243,599
Iowa	822,107	822,101	30,949	30,949	197,197	197,197	1,050,253	1,050,247
Michigan	772,858	772,858	3,862	3,862	4,863,797	4,863,797	5,640,517	5,640,517
Minnesota	798,570	798,570	52,362	52,362	62,279	62,279	913,211	913,211
Montana	13,133	13,125	5,276	5,276	21,557	21,557	39,966	39,966
Nebraska	99,719	99,719	16,951	16,951	17,547	17,547	134,217	134,217
North Dakota	23,653	23,663	2,559	2,559	1,253	1,253	27,415	27,415
Ohio	408,675	408,664	18,778	18,778	1,846,729	1,846,729	2,274,182	2,274,171
South Dakota	61,540	61,540	43,176	43,176	29,016	29,016	133,732	133,732
Wisconsin	3,512,267	3,511,706	92,675	92,446	1,444,739	1,441,953	5,049,702	5,046,155
Wyoming	4,188	4,101	575	425	53	53	4,816	4,850
Totals	7,130,448	7,129,751	316,799	316,536	10,700,496	10,697,710	18,147,743	18,143,999

GRAND SUMMARY BY YEARS, ORIGINAL BUSHES, SPROUTING BUSHES, AND SEEDLINGS, 1919 to 1929.

Table 21. Data showing, by calendar years, the total numbers of original bushes, sprouting bushes, and seedlings found and destroyed in all surveys in the barberry eradication campaign, from April 1, 1919, to December 31, 1929.

Year	Original bushes		Sprouting bushes		Seedlings		Totals	
	Found	Destroyed	Found	Destroyed	Found	Destroyed	Found	Destroyed
1919	1,842,239	1,590,475	1,956	1,556	500	500	1,844,735	1,592,971
1919	2,095,053	2,025,569	17,674	17,974	3,500	3,500	2,117,437	2,043,753
1920	1,505,007	513,315	33,140	33,149	1,500	1,500	1,540,555	552,963
1921	175,552	209,647	27,697	27,697	10,557	10,557	221,913	255,901
1922	209,397	729,721	64,352	63,893	69,733	69,733	343,482	863,337
1923	233,151	251,013	106,700	106,145	3,635,581	3,610,681	4,005,442	3,937,639
1924	295,814	389,532	21,852	21,850	847,771	844,465	1,165,437	1,254,967
1925	142,550	149,822	17,036	17,141	701,796	754,505	881,362	921,466
1926	204,530	723,580	16,149	15,504	2,062,569	2,034,805	2,283,355	2,604,689
1927	207,446	223,659	5,899	6,203	1,475,209	1,475,284	1,688,554	1,705,346
1928	114,416	115,031	2,849	2,849	1,407,500	1,407,990	1,524,655	1,525,670
1929	103,163	104,267	1,247	1,248	443,070	443,170	550,460	551,685
Totals	7,130,448	7,129,751	315,799	315,536	10,700,496	10,697,710	18,147,743	18,143,999

NUMBERS OF BARBERRY BUSHES AND SEEDLINGS DESTROYED 1918-1929

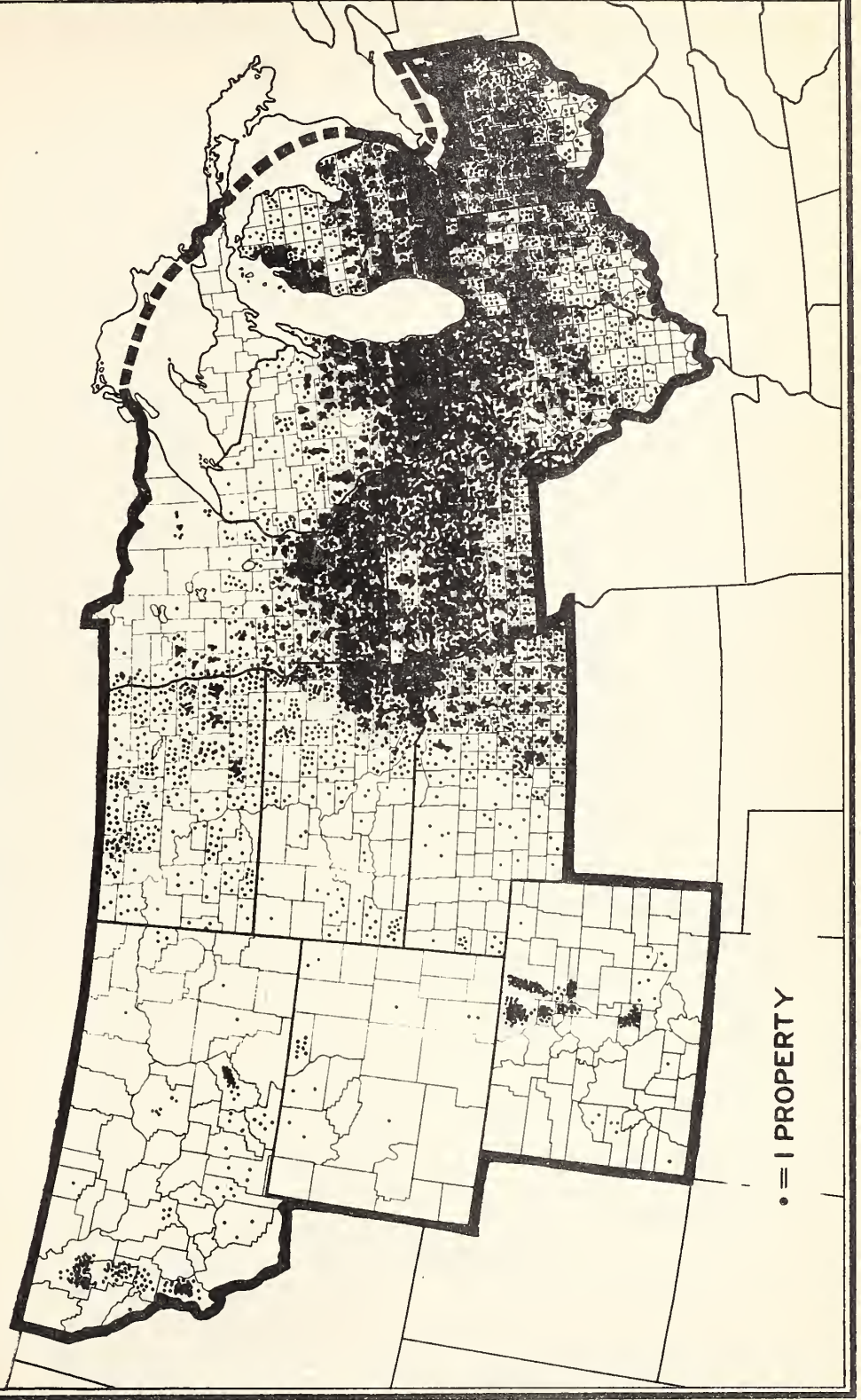


SUMMARIZED RESULTS

ITEM	DESTROYED
BUSHES	7,129,751
SEEDLINGS	10,697,710
SPROUTING BUSHES	316,538
GRAND TOTAL	18,143,999

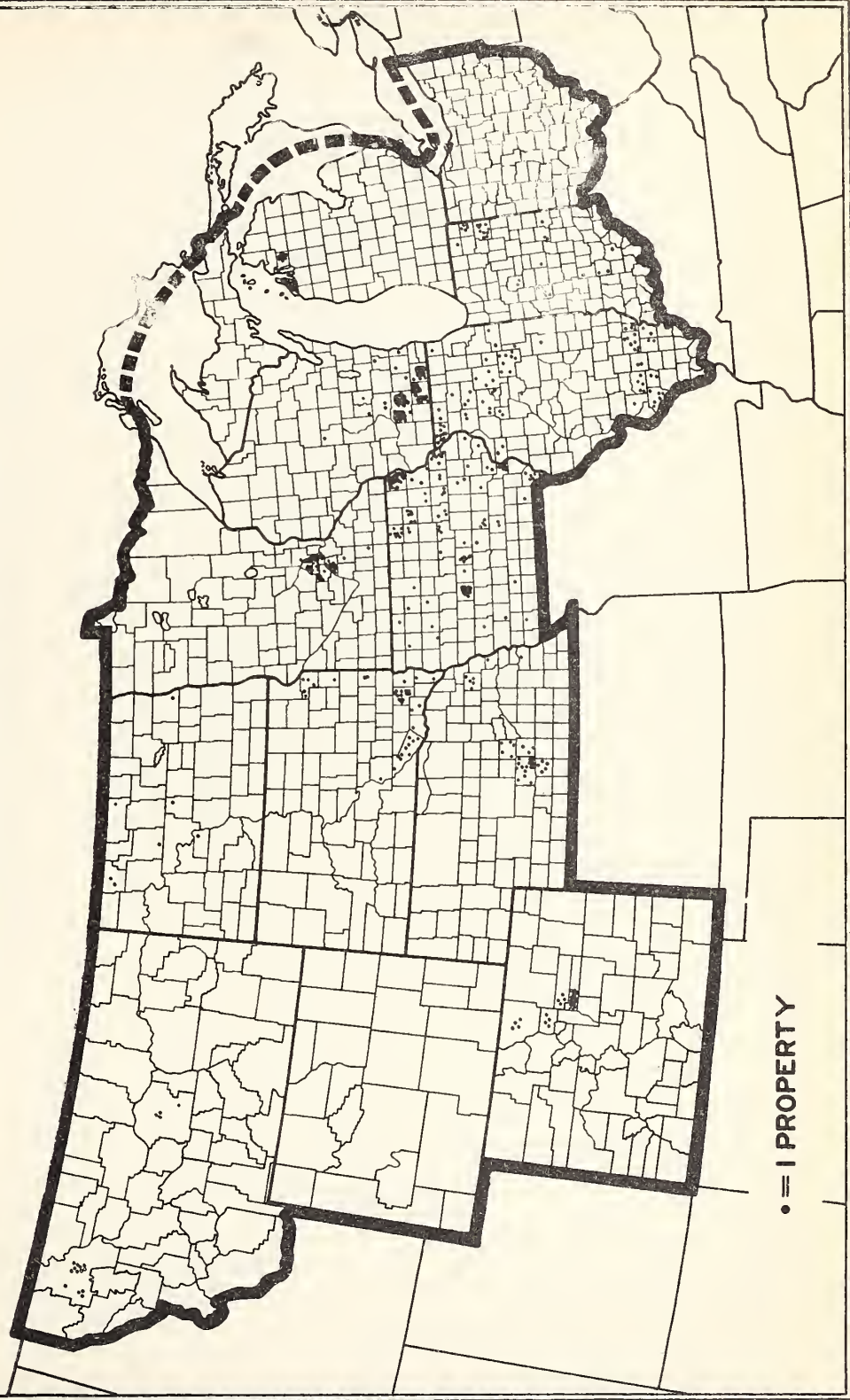
RURAL PROPERTIES ON WHICH BARBERRY BUSHES WERE FOUND-ALL SURVEYS

BARBERRY ERADICATION, 1918-1929



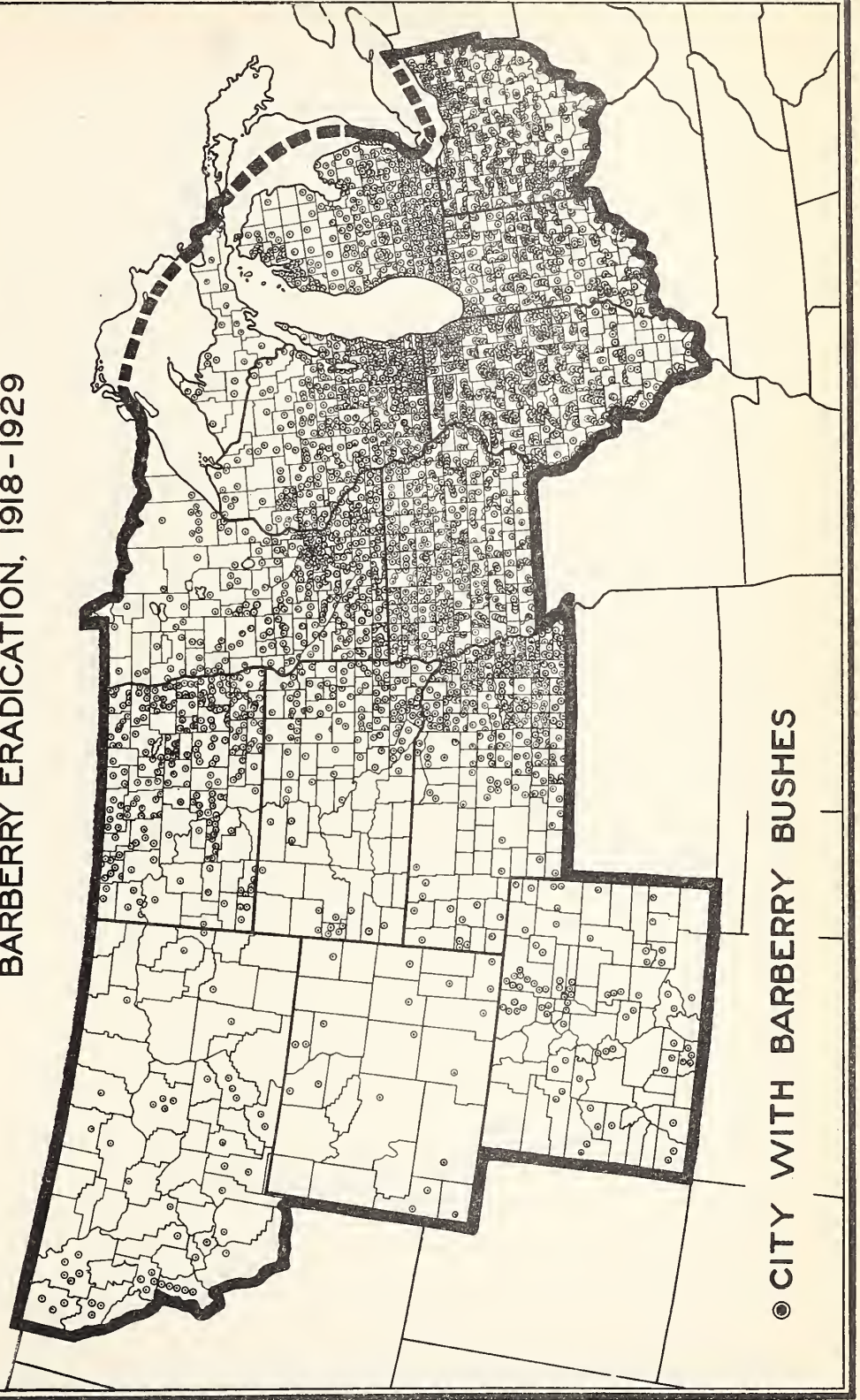
RURAL PROPERTIES ON WHICH BARBERRY BUSHES WERE FOUND-ALL SURVEYS

BARBERRY ERADICATION, 1929



CITIES IN WHICH COMMON BARBERRY BUSHES WERE FOUND - ALL SURVEYS

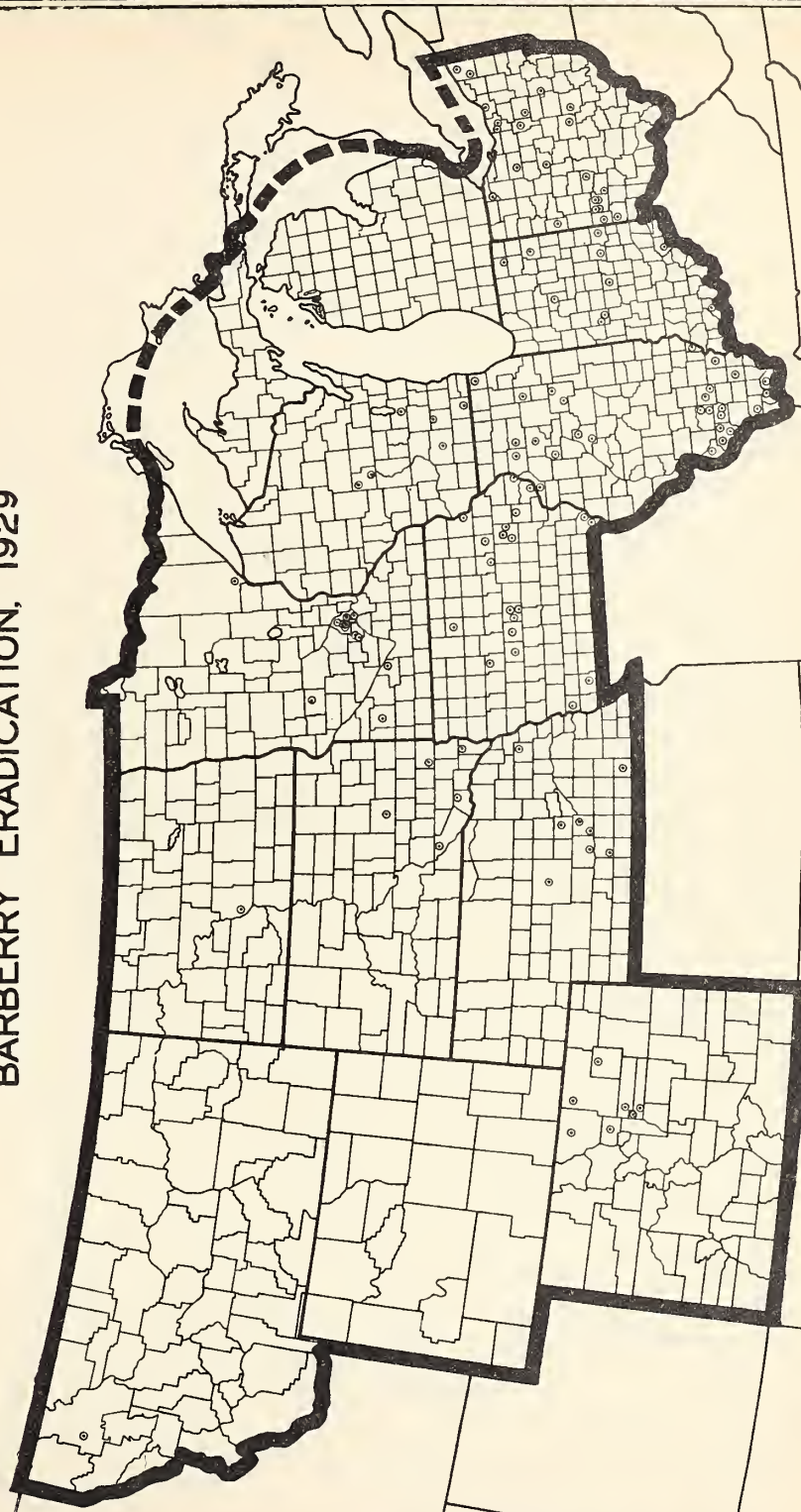
BARBERRY ERADICATION, 1918-1929



● CITY WITH BARBERRY BUSHES

CITIES IN WHICH COMMON BARBERRY BUSHES WERE FOUND - ALL SURVEYS

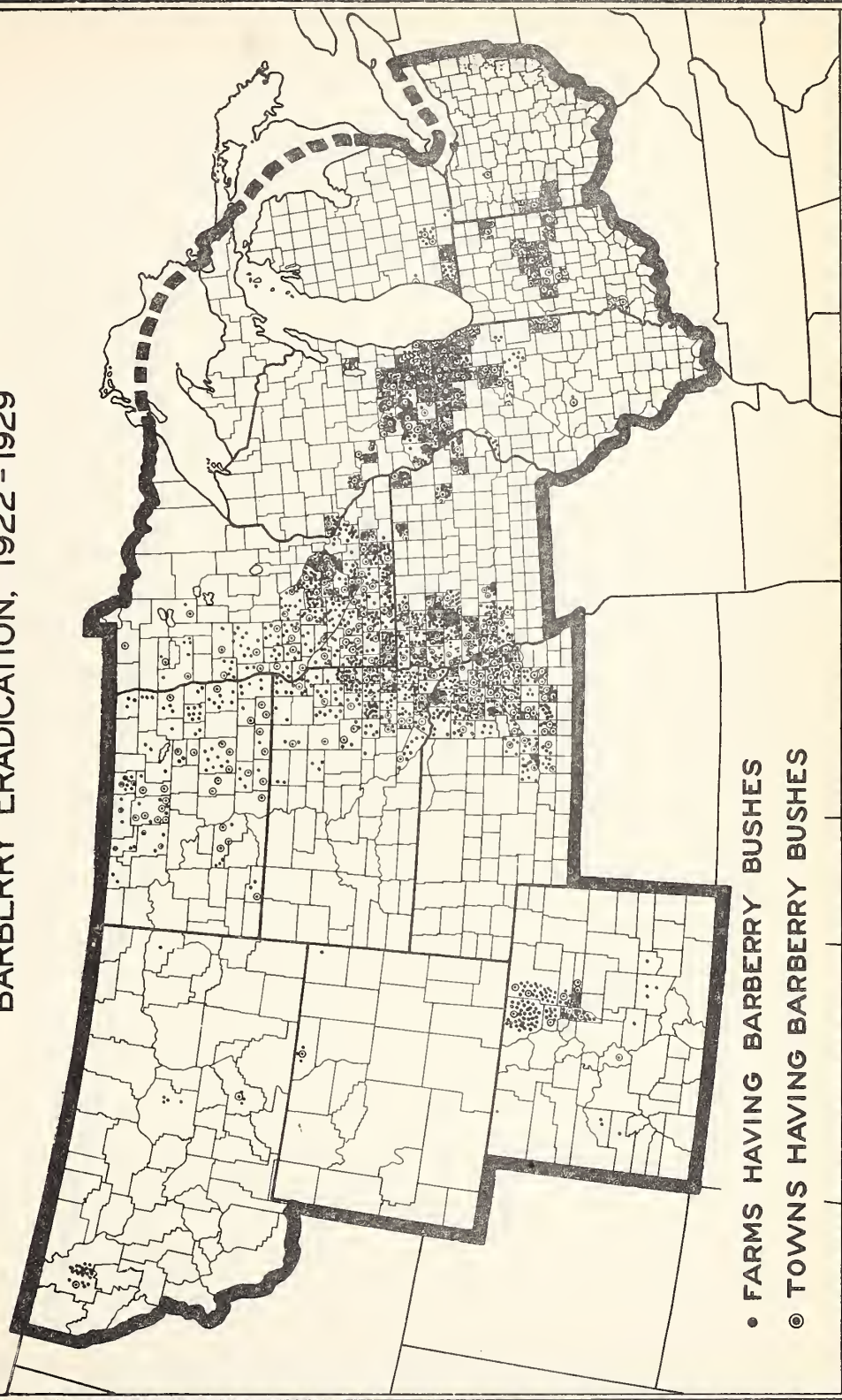
BARBERRY ERADICATION, 1929



● CITY WITH BARBERRY BUSHES

RURAL PROPERTIES ON WHICH, AND CITIES IN WHICH BARBERRY BUSHES WERE FOUND SECOND SURVEY

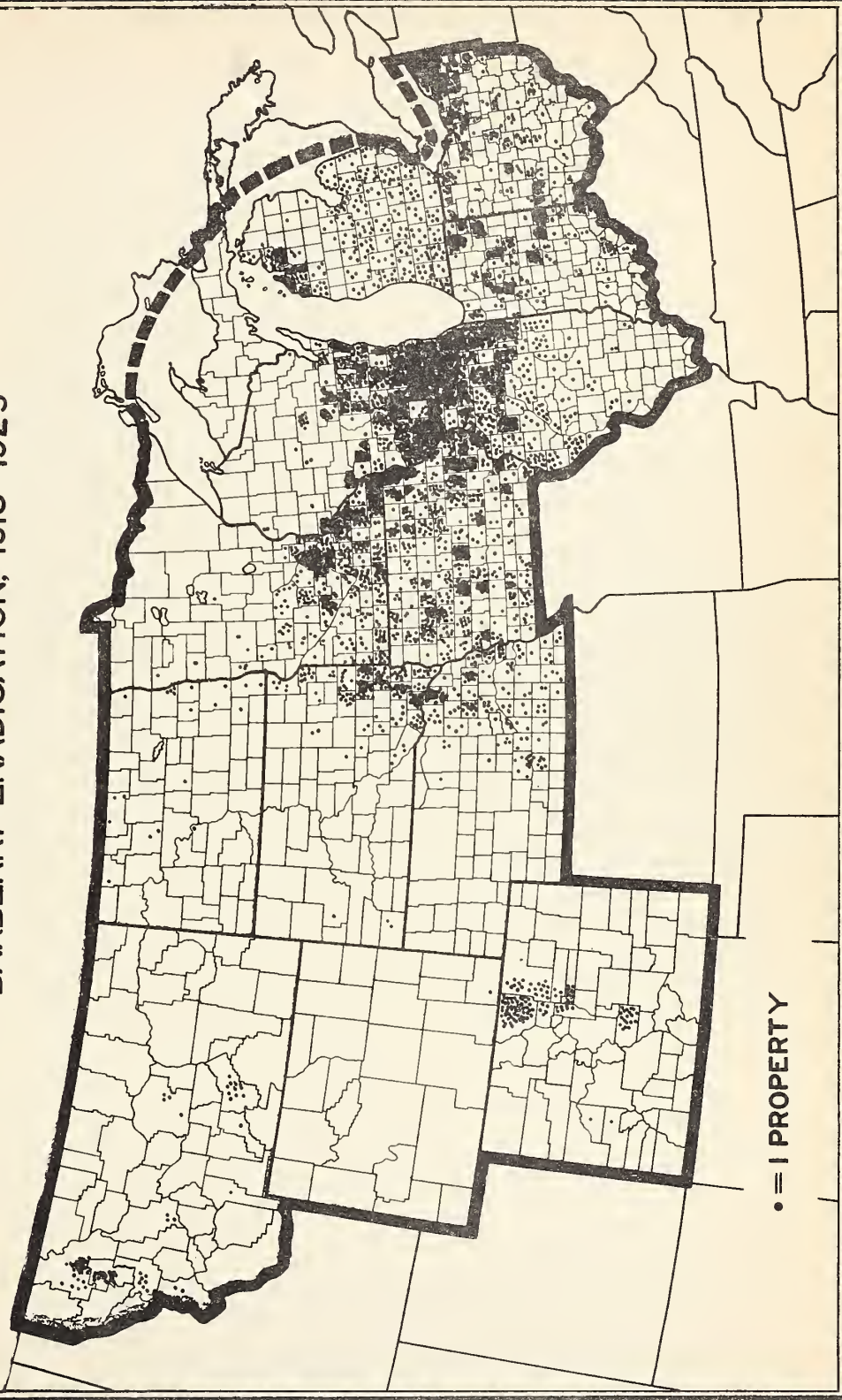
BARBERRY ERADICATION, 1922 - 1929



- FARMS HAVING BARBERRY BUSHES
- ◉ TOWNS HAVING BARBERRY BUSHES

RURAL PROPERTIES ON WHICH ESCAPED BARBERRY BUSHES WERE FOUND - ALL SURVEYS

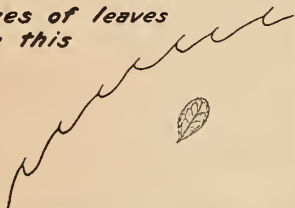
BARBERRY ERADICATION, 1918-1929



Common Barberry Spreads Black Stem Rust

*When you find
a spiny bush
with -*

*Edges of leaves
like this*



Spines like these



Berries like these



Inner bark yellow



*It is a
Common Barberry
and should be
reported at once*

**Know
Common
Barberry**

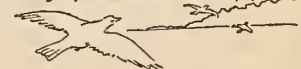
Look For It!

*Spread of
Barberries by
birds*

*Birds eat the
berries*



*Carry them to their
roosting places*



*Where they cough
up the seeds*



*From which seedling
bushes grow*



*They in time
bear fruit which
is again carried
farther on*

**Look For and Report All Common Barberry Bushes
found in the Thirteen North Central States of the Barberry Eradication Area**

Office of Barberry Eradication, Bureau of Plant Industry,
United States Department of Agriculture, Washington, D. C.

Common Barberry Bushes

spread

Black Stem Rust

to

WHEAT, OATS,
BARLEY, RYE,
and Many Wild
Grasses

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